



VU Research Portal

Modelling macroeconomic employment policy

den Butter, F.A.G.

1989

document version

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

citation for published version (APA)

den Butter, F. A. G. (1989). *Modelling macroeconomic employment policy*. (Serie Research Memoranda; No. 1989-42). Faculty of Economics and Business Administration, Vrije Universiteit Amsterdam.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

vuresearchportal.ub@vu.nl

ET

05348

1989
42

SERIE RESEARCH MEMORANDA

MODELLING MACROECONOMIC EMPLOYMENT POLICY

Research Memorandum 1989-42

August 1989

F.A.G. den Butter



**VRIJE UNIVERSITEIT
FACULTEIT DER ECONOMISCHE WETENSCHAPPEN
EN ECONOMETRIE
AMSTERDAM**

**MODELLING MACROECONOMIC
EMPLOYMENT POLICY**

**Effects of fiscal and
monetary policy in the Netherlands**

by F.A.G. den Butter

For presentation at the Conference "The Art of Full Employment",
Maastricht, September 28-30, 1989.
(Session 4, September 28, 16.00 - 17.10 h.)

Preliminary version, August 1989

Department of Economics
Free University
P.O. Box 7161
1007 MC Amsterdam
The Netherlands

MODELLING MACROECONOMIC EMPLOYMENT POLICY

Effects of fiscal and monetary policy in the Netherlands

F.A.G. den Butter

Abstract

This paper analyses the effects of fiscal and monetary policy on economic activity and employment by means of various stylized versions of main-stream macro-economic policy models for the Netherlands. The simulations of this paper illustrate the working and quantitative importance of a number of mechanisms, which play a major role in modern textbook macro-economics, such as crowding out, Ricardian equivalence, accommodating versus non-accommodating monetary policy, exchange rate policy and its reputation effects. It appears that the size and even the sign of the effects strongly depend on the way the economy has been modelled. Crucial parameter values are important in this respect, but more so differences in model specification which mirror differences in interpretation and in theoretical thinking on how the economy works. Yet, according to our simulations, fiscal and monetary policy is not very effective in enhancing total income and employment. As compared to other policy measures exchange rate policy is shown to yield relatively large effects.



MODELLING MACROECONOMIC EMPLOYMENT POLICY

Effects of fiscal and monetary policy in the Netherlands

F.A.G. den Butter*

1. Introduction.

The analysis of the effects of monetary and fiscal policy on economic activity, and hence on the labour market, is at the core of macroeconomic theory. Standard textbook theory shows how fiscal policy leads to a shift of the IS-curve and monetary policy to a shift of the LM-curve. Open economy macroeconomics adds a BP-curve to this diagram. Under fixed exchange rates and high capital mobility, a simple rule says that monetary policy will achieve external balance and fiscal policy will achieve full employment. When exchange rates are flexible and capital is very mobile, fiscal policy becomes totally ineffective in changing real economic activity, but monetary policy retains its effectiveness. In this context various versions of the Mundell-Flemming model predict the impact of monetary and fiscal policy on internal and external equilibrium in case of either flexible or fixed exchange rates (see e.g. Parkin and Bade, 1982, pp. 317-338; Frenkel and Razin, 1987).

In policy practice, however, things are less clear cut than these simple theoretical models suggest. This paper intermediates between policy practice and macroeconomic theory by analyzing the impact of fiscal and monetary policy on economic activity and employment using stylized versions of empirical macroeconomic policy models for the Netherlands. These stylized models reflect the main characteristics of the models which are used in actual policy, but are at the same time flexible enough as to illustrate how the alternative assumptions on which theory focusses may affect the working of the models.

The next section shortly introduces the models used in the simulations of this study, and indicates their relationship with the actual Dutch policy models. Section 3 gives the transmission channels of fiscal and monetary policy in these models. Sections 4 to 8 show the differences in working of the various models by simulating monetary and fiscal policy under alternative conditions. Section 4 discusses the crowding-out argument for a policy of fiscal restraint which reduces the financial deficit of the government. Section 5 illustrates how the occurrence of so called Ricardian equivalence may make this policy of fiscal restraint more effective. Section 6 considers the case that the policy of fiscal restraint is accompanied by non accommodating monetary policy. Section 7 illustrates the effects of a money

* Professor of Economics and Head of the Applied Labour Economics Research Team (ALERT), Free University, P.O. Box 7161, 1007 MC Amsterdam, The Netherlands.

supply policy whereas section 8 focusses on exchange rate policy. Section 9 finally discusses, against the background of the simulation results of this paper, the scope for actual monetary and fiscal policy in the Netherlands to enhance economic activity and employment.

2. Stylized policy models.

The Netherlands have a long standing tradition in the use of macroeconomic models in policy analysis. The results of policy simulations made with models are not only discussed by government experts and by academics, but also amply in Parliament and press. These results carry a large weight in the design of macroeconomic policy. Three generations of policy models may be distinguished. (See Chapter 2 of Den Butter, 1987). Model based macroeconomic policy analysis was for a long time almost the Dutch Central Planning Bureau's monopoly. In the fifties and sixties, years of prosperous economic growth and nearly full employment, this Bureau used short term demand determined Keynesian models. The purpose of the models was cyclical analysis. At the beginning of the seventies a second generation of models substituted the first generation. This new generation endogenizes the supply side of the economy, using a vintage approach for modelling productive capacity and labour demand. The third generation of models was built at the beginning of the eighties. These models comprise a fully fledged description of the monetary sector. Moreover in these years a proliferation of the use of macro models for policy purposes has taken place. The Central Planning Bureau lost its monopoly in this field as other Government Agencies, the Central Bank and Research Institutes at Universities started to use their own models for policy advice.

The changing of the generations of models has played an important part in the model based policy analysis in the Netherlands. The formation of the Lubbers-I Cabinet in 1982 marks a main turning point in this respect. At September 15, on behalf of the formation of the Cabinet, the Presidium of the Central Economic Commission (CEC) published a memorandum which surveyed economic developments and the consequences of a number of policy measures for the next period of government. The various scenarios of this memorandum are calculated by the Central Planning Bureau's new FREIA model which on this occasion made its first public appearance. Especially Chart 1 in this memorandum has had a large impact on the proposals for economic policy in the so called "government agreement" of the Lubbers-I Cabinet. This chart illustrates the mechanism that a policy of reducing the government deficit by less government expenditure will in the short run lead to less private expenditure and employment, but will in the long run have favourable effects on the economy because of reversed crowding out effects. Quite remarkably, at the moment of publication of the CEC memorandum nobody outside the Central Planning Bureau knew about the FREIA model. It was more than a year later, in November 1983, that the Central Planning Bureau published a monograph with an extensive description of the FREIA model. However, according to the simulations in this monograph, a reduction of government expenditure does not lead to such turn

from an unfavourable to a favourable effect as shown by the simulations of the CEC memorandum. Most probably the simulations of the CEC memorandum are based on a number of supplementary assumptions.

The simulations of the effects of fiscal and monetary policy in this paper are made with own versions of a quarterly model for the Netherlands, which incorporate as much as possible the main characteristics and mechanisms of the three generations of Dutch policy models. In fact, we consider two models, named Mod CS and Mod CSM (C = cycle, S = structure and M = monetary), as starting point for the simulations. Mod CS, representing the second generation of policy models, adds a supply side block determining productive capacity and labour demand to a first generation demand-determined Keynesian model. Mod CSM extends Mod CS with a number of behavioural equations and identities from the monetary sector. As such this model represents the third and present generation of Dutch policy models.

Instead of comparing the results of existing models we use own versions of the models mainly because these models are stylized and consequently do not contain as much detail as the proper policy models. Hence they allow us to concentrate on those changes in the specifications of the models which lead to a major change in the working of the models.

Table 1. Content of the models.

Model	equations
Mod CS	<ul style="list-style-type: none"> - consumption function - investment equation - export equation - import equation - stock building - definition of income - demand for money function - wage and price equations - inflationary expectations formation - productive capacity and labour demand determined by quasi vintage approach - labour supply equation
Mod CSM	<ul style="list-style-type: none"> - Mod CS plus - equation for net foreign capital market transactions of the private sector - balance of payments identity - technical equation for interest payments by the government - budget restriction of the government - demand for credit equation - macroeconomic budget restriction - interest equation

Table 1 summarizes the main characteristics of the models used here. The annex contains a formal definition of the models and

their equations. It also comprises a list of symbols. The specifications of the equations of the models and the selected values of their coefficients are, for a major part, based on the empirical literature. In this selection process the outcomes of the Dutch policy models have played a prominent part. Hence, the coefficients are deliberately not determined by estimation. Our procedure aims at exploiting as much as possible the empirical knowledge on the Dutch economy obtained in the course of time. Of course, selecting specifications of equations and values of coefficients from the literature is rather arbitrary. Yet, in our opinion, such a compilation of empirical knowledge exploits much more information than a respecification and re-estimation of behavioural relationships that have extensively been studied before. Moreover, experience tells that a re-estimation of traditional macroeconomic behavioural equations always needs a look at other empirical evidence in order to obtain plausible estimates.

After the selection of the specifications of the equations and the values of the coefficients, the performance of the models to describe the past is tested by a dynamic simulation over the period 1973 - 1986. The results of these dynamic simulations appear to be most satisfactory, the more so as none of these models contains dummy-variables which comply with specific events as is common use in actual policy models. For more detail and information on the selected models and for references to the literature we refer to Den Butter (1987, 1989).

3. Policy transmission channels.

The stylized models of this paper comprise the main transmission channels of fiscal and monetary policy which are also at work in the policy models. With respect to fiscal policy these channels are:

- government expenditure as an autonomous part of real income (eq. 1h of the annex).
- tax receipts of the government which determine disposable income (eq. 1i).
- the burden of taxation which influences price and wage formation representing the effects of tax evasion (eq. 3a and 3b).
- (in Mod CSM) the government budget constraint (eq. 8a) including the endogenous interest payments on government debt (eq. 9f).

In combination with the macroeconomic budget restriction (eq. 9k), according to which the financial surpluses and deficits of the private, public and foreign sectors sum to zero, the government budget constraint also forms the main link in the interaction between fiscal and monetary policy.

Monetary policy is modelled to be transmitted through:

- the real interest rate as a determinant of the volumes of consumption and investment (eq. 1a and 1b).
- the real money stock as a determinant of the volumes of consumption and investment (eq. 1a and 1b), representing the effects of real wealth or of monetary ease (e.g. availability of credit) in the respective expenditure equations.

- the real interest rate as a determinant of the scrapping of obsolete capital stock (eq. 5i); this transmission channel has not been built into the actual policy models but is reminiscent of Malcomson's (1975) scrapping condition which holds under imperfect competition; its quantitative influence, however, appears to be rather limited (see Den Butter, 1977).
- the exchange rate which, via import prices (eq. 7a), is a determinant of the volumes of imports and exports (eq. 1f and 1e), representing the influence of the competitive position; the exchange rate influences domestic prices as a cost factor (eq. 3a).

The latter channels are direct channels of exchange rate policy. The exchange rate, or to be more precise, exchange rate expectations, also have an indirect influence on the real economic sector through monetary transmission as they are determinant of the (nominal) interest rate (eq. 10a) and the foreign capital transactions of the private sector (eq. 9c).

4. Fiscal policy and crowding out.

This paper's simulations of the effects of fiscal policy on economic activity and on the labour market focus on the policy of restraint by reducing government spending. Hence, this paper pays no attention to tax rates as an instrument of fiscal policy (see Den Butter and Compaijen, 1989, for simulations with respect to taxation and social security contributions in similar models). The policy of fiscal restraint is simulated by means of a permanent and autonomous reduction of government expenditure by 1% of national income. Each simulation is run over a period of 24 quarters (6 years). The baseline projection is based on the values of the exogenous variables in the fourth quarter of 1986. The reduction of government expenditure starts in the first quarter of the simulation period. The effects of the impulses are measured as differences from the baseline projections. In each behavioural equation the constant term is set equal to its mean value in the reference period, given the selected values of the coefficients.

Table 2 gives the results of the simulations of fiscal restraint according to the representatives of the second and third generations of Dutch policy models, Mod CS and Mod CSM. The aim of these simulations is to investigate whether the working of the third generation model differs from that of the second generation model with respect to the crowding out argument. As mentioned in section 2 the first FREIA-simulations suggest such a difference in working.

The results for Mod CS presented in the left hand part of table 2 illustrate that the expenditure policy leads to the desired reduction of the government deficit indeed. However, over the whole simulation period, total expenditure remains below the baseline level. Demand for labour decreases somewhat and hence unemployment increases. The Phillips-curve effect induces a slight reduction of wages. Prices do not deviate from baseline level, because the opposite effects of the decrease of the utilization rate of capital goods and of the decrease of labour productivity compensate each other in the price equation. The

reduction of the utilization rate of capital goods and the fall of total demand have a negative effect on the volume of imports. As the volume of exports remains almost unaltered, the expenditure policy causes a surplus on the current account of the balance of payments.

The right hand part of table 2 shows that the effects of the expenditure policy in Mod CSM hardly differ from the effects in Mod CS discussed above. This is remarkable as no substantial "crowding in" of private expenditure appears to result from this policy. As a matter of fact the simulations with Mod CSM show no turn from unfavourable to favourable effects, not even in the long run. In conformity with "crowding in" theory the government needs less debt financing due to the reduction of its deficit. However, this results in a very small decrease of the long term interest rate only. Investment is hardly affected by this decrease. In this respect we note that the reduction of the government deficit results in a decrease of the financial surplus of the private sector as well. The improvement of the balance of payments appears not to be sufficient for neutralizing this effect. Therefore capital market financing by the private sector increases, which somewhat reduces the downward pressure on the interest rate caused by the decreased capital financing of the government. Yet, the effect of the policy of reducing government expenditure on the government deficit appears in the end to be somewhat larger in Mod CSM than in both other models. This is due to the interest payments of the government which are endogenous in Mod CSM. This part of government expenditure diminishes somewhat as a result of the lower deficit and the fall in the interest rate.

Table 2. The effects of an autonomous reduction of government expenditure of 1% of national income.
(in % of the baseline projection, unless stated otherwise)

on	according to Mod CS					Mod CSM			
		(second generation)				(third generation)			
	after	1qr	1yr	3yr	6yr	1qr	1yr	3yr	6yr
Volume of income		-0.7	-0.5	-0.4	-0.4	-0.7	-0.5	-0.4	-0.4
Volume of private consumption		-0.6	-0.6	-0.4	-0.4	-0.6	-0.5	-0.4	-0.4
Volume of investments		-0.9	-0.4	-0.7	-0.6	-0.8	-0.3	-0.4	-0.3
Price level		-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.1	-0.1
Wage level		-0.1	-0.5	-0.4	-0.4	-0.1	-0.5	-0.4	-0.3
Demand for labour		-0.1	-0.2	-0.1	-0.2	-0.1	-0.2	-0.1	-0.2
Money stock (deflated)		-0.1	-0.2	-0.3	-0.3	-0.1	-0.1	-0.0	0.1
Unemployment (in lab. years x1000)		3	7	3	5	3	7	3	5
Surplus current account (in % NI)		0.7	0.9	0.9	0.8	0.7	0.9	0.8	0.7
Fin. deficit government (in % NI)		-0.9	-0.9	-0.9	-0.8	-0.9	-1.0	-1.1	-1.3
Interest rate (%-points)		-	-	-	-	-0.1	-0.1	-0.1	-0.2

All in all these simulations show that according to Mod CSM the "crowding in" effect is of no quantitative importance. Hence the extension of Dutch policy models with a submodel of the monetary sector appears not to provide a strong argument for the policy of reducing government expenditure. The two chains in the crowding out mechanism, namely the interest rate sensitivity of invest-

ment and the influence of capital market financing by the government on the long term interest rate, are to weak as to make this argument of quantitative importance. This is not only true for the stylized third generation model Mod CSM used here, but in fact for most Dutch third generation models which are actually used in policy analysis. (see e.g. table 6.8 in De Nederlandsche Bank, 1985; table 5.6 in Kuipers *et al.*, 1988; table 5.4 in Centraal Planbureau, 1983; table 4 in Okker, 1988; and table 9 in Den Butter, 1988).

Table 3. The effects of an autonomous reduction of government expenditure of 1% of national income.
(in % of the baseline projection, unless stated otherwise)

on	according to Mod CSM (third generation, quadrupling int. rate elast.inv.)					Mod CSM (idem, quadrupling infl. cap. market fin. on interest rate)				Mod CSM (idem, quadrupling of both coefficients)				Mod CSM (idem, exogenous int. payments of government)			
	after	1qr	1yr	3yr	6yr	1qr	1yr	3yr	6yr	1qr	1yr	3yr	6yr	1qr	1yr	3yr	6yr
Volume of income		-0.7	-0.5	-0.3	-0.2	-0.7	-0.4	-0.3	-0.2	-0.7	-0.4	-0.1	0.3	-0.7	-0.4	-0.2	0.0
Volume of private consumption		-0.6	-0.5	-0.2	-0.1	-0.6	-0.4	-0.0	0.3	-0.6	-0.4	0.1	0.9	-0.6	-0.4	0.0	0.3
Volume of investments		-0.9	-0.0	0.1	0.6	-0.8	-0.1	0.1	0.8	-0.8	0.7	2.0	5.1	-0.8	0.6	1.2	2.3
Price level		-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.1	-0.1
Wage level		-0.1	-0.4	-0.4	-0.3	-0.1	-0.4	-0.3	-0.2	-0.1	-0.4	-0.3	0.1	-0.1	-0.4	-0.3	-0.1
Demand for labour		-0.1	-0.2	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.1	-0.2	0.0	0.3	-0.1	-0.2	-0.0	0.1
Money stock (deflated)		-0.1	-0.1	-0.0	0.2	-0.1	0.0	0.5	1.3	-1.4	-1.5	-1.0	-0.2	-0.1	0.0	0.4	0.8
Unemployment (in lab. years x1000)		3	7	1	2	3	7	3	6	3	6	-0	-6	3	6	0	-2
Surplus current account (in % NI)		0.7	0.9	0.9	0.8	0.7	0.8	0.7	0.4	0.7	0.8	0.6	0.2	0.7	0.8	0.7	0.5
Fin. deficit government (in % NI)		-0.9	-1.0	-1.2	-1.5	-0.9	-1.0	-1.2	-1.6	-0.9	-1.0	-1.4	-2.0	-0.9	-0.9	-0.9	-0.9
Interest rate (%-points)		-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.4	-0.7	-0.1	-0.2	-0.5	-0.9	-0.1	-0.2	-0.3	-0.4

This result makes it an interesting question for what value of, on the one hand, the influence of the interest rate on investment and, on the other hand, the influence of capital market financing on the interest rate, this mechanism, in fact, describes the alleged turn from an unfavourable to a favourable effect. Table 3 presents the results of such sensitivity analysis. Although the interest rate and/or capital costs appear as explanatory variables in the expenditure equations in almost all macro-economic models, the estimated negative influence of these variables proves to be rather small. The basis variant of the models used here assumes a long-term elasticity of the real interest rate with respect to investment of -0.1. The influence of capital financing and especially of the government deficit on the long term interest rate has recently obtained much empirical attention (See e.g. Acx and De Vijlder, 1985, Bovenberg, 1987, Evans, 1987a, 1987b, Feldstein, 1986, Hoelscher, 1986, Naudts and Schokkaert, 1988, Van Sinderen, 1982, Zahid, 1988, Tanzi, 1985, with a reaction by Spiro, 1987, and a reply by Tanzi, 1987). None of these studies measures a large influence of the deficit on the interest rate. Most certainly not in the case of small open economies such as the Netherlands where the domestic interest rates are, to a large extent, determined by the foreign interest rates. Van Loo (1984) surveys a number of empirical results for the Netherlands. With reference to this survey the basis variant of the models used here assumes that a reduction of capital market financing by the government by the amount of 1 % of national income leads to a fall of the interest rates of 0.25 %-

points. The corresponding coefficient with respect to private sector capital market financing is set to the same value (eq. 10a).

The sensitivity analysis investigates a quadrupling of these coefficients, first one by one, and then both. The first part of table 3 gives the effects of the expenditure policy according to the variant of Mod CSM in which the interest rate elasticity of investment has been quadrupled and hence has obtained a long term value of -0.4. The outcomes of this simulation appear to be hardly different from those of the basis variant. Like in the basis variant the reduction of expenditure leads to a fall in demand, also in the long run, and the negative effect on unemployment is almost as large as in the basis variant. Yet, the decreased interest rate induces investment to level with the baseline in spite of the fall in demand.

The next variant has the influence of capital market financing on the interest rate quadrupled. This variant assumes that a reduction of capital market financing to the amount of 1 % of national income causes the interest rate to fall with 1 %-points; this influence is notably larger than measured in the empirical studies surveyed by Van Loo. The simulation results in the second part of table 3 show that in this case the reduction of government expenditure indeed leads to a substantial fall of the interest rate. However, this fall has hardly any effect on total expenditure and on demand for labour.

The third part of table 3 gives the simulation results for the variant of Mod CSM in which the size of both chains in the crowding out mechanism has been quadrupled. In this case, with the interest payments of the government acting as a fly-wheel, the fall of the interest rate and the reduction of the government deficit appear to interfere in such a way that at the end of the simulation period of six years total expenditure and labour demand are again at the level of the baseline. Investments constitute the engine for this turn of effects. Yet, even according to this variant in which the relevant coefficients have obtained values, which are hardly realistic, the reduction in government expenditure does not lead to more labour demand. It corroborates the conclusion drawn before that the "crowding in" mechanism does, in this respect, not provide empirical support for the policy of reducing public expenditure.

The alleged influence of the interest payments by the government has played a major role in the discussions on the policy of government expenditure in the Netherlands (see e.g. Wellink, 1987a, 1987b, and for a different opinion, Van Muiswinkel, 1985). In order to investigate this influence the last part of table 3 gives the results of the expenditure policy according to a variant of Mod CSM in which the relevant coefficients are quadrupled as in the previous variant but in which the interest payments by the government are assumed exogenous. A comparison of the results according to this and the previous variant shows that the interaction between the fall in interest rates and the size of the interest payments is of such an order of magnitude that the final effect of a reduction in expenditure on the financial deficit and on the long term interest rate is more than

doubled by this interaction. Thus, in case the "crowding in" effect via the interest rate mechanism would be of quantitative importance, the interest payments by the government would constitute an important chain in this mechanism.

5. Fiscal policy and Ricardian equivalence.

The simulations of the preceding section only consider the reversal of the crowding out effects by means of the interest rate mechanism. However, in the recent literature there has been much debate about the neutrality of government debt. This neutrality proposition or Ricardian equivalence implies that it makes no difference whether additional public spending is financed by issuing bonds or by taxation. In that case a direct crowding out of private by public spending results. Although there exists no empirical evidence for Ricardian equivalence in the Netherlands (see De Haan and Zelhorst, 1989) and the evidence for other countries on this issue is inconclusive, we have done some simple simulations on the policy of fiscal restraint in order to investigate how the assumption of Ricardian equivalence affects the working of the models.

There are a number of ways to model Ricardian equivalence (see Leiderman and Bleijer, 1988). For our purposes Ricardian equivalence has been modelled in a very simple way, viz. by subtracting the real value of the financial deficit of the government partly or fully (depending on the value of the parameter τ ; eq. 1a) from disposable income. Hence the parameter τ indicates the extent to which future tax payments are anticipated in response to debt financing of public expenditure. In case of full Ricardian equivalence τ is set equal to unity. Of course τ is equal to zero in all simulations of this paper that do not assume Ricardian equivalence.

The left hand side of table 4 gives the simulation results of a policy of reduction of government spending according to Mod CSM under full Ricardian equivalence. The table illustrates that under this assumption less government expenditure leads to more private consumption indeed. However, the quantitative effect appears to be rather limited, so that, even in the long run, hardly any positive effect on total income and employment results.

The right hand side of table 4 gives the results of the expenditure policy according to Mod CSM in which full Ricardian equivalence is combined with the high coefficient values in the interest rate mechanism. This simulation finally shows the effects of the policy of fiscal restraint to turn from unfavourable to favourable in the long run. In comparison to the other simulation results so far, the positive long run effects on total income and unemployment appear to be substantial. However, we mention again that the specification of this model is not in conformity with empirical evidence for the Netherlands. Moreover, the results appear to be rather sensitive to specification changes in the equation for the demand for credit by the private sector (eq. 9j). This equation describes to what extent a

reduction of the government deficit leads to more private sector borrowing.

Table 4. The effects of an autonomous reduction of government expenditure of 1% of national income.
(in % of the baseline projection, unless stated otherwise)

	according to Mod CSM (Ricardian equivalence)					Mod CSM (Ric. equ., quadrupling interest rate sens. coefficients)			
	after	1qr	1yr	3yr	6yr	1qr	1yr	3yr	6yr
Volume of income		-0.4	-0.1	-0.0	0.1	-0.4	0.0	0.4	1.5
Volume of private consumption		0.5	1.1	1.4	1.8	0.5	1.5	2.6	5.1
Volume of investments		-0.4	0.2	0.2	0.4	-0.4	2.0	4.3	9.2
Price level		-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.1
Wage level		-0.1	-0.2	-0.0	0.1	-0.1	-0.1	0.2	1.0
Demand for labour		-0.1	-0.1	-0.0	-0.0	-0.1	-0.0	0.2	0.7
Money stock (deflated)		-0.0	0.1	0.3	0.5	0.0	0.4	1.4	3.3
Unemployment (in lab. years x1000)		2	2	1	1	2	0	-4	-17
Surplus current account (in % NI)		0.4	0.3	0.1	-0.2	0.4	0.1	-0.6	-1.9
Fin. deficit government (in % NI)		-1.0	-1.1	-1.2	-1.5	-1.0	-1.2	-1.6	-2.6
Interest rate (%-points)		-0.1	-0.1	-0.2	-0.2	-0.2	-0.4	-0.7	-1.3

6. Fiscal policy and non-accommodating monetary policy.

In contrast to the models mentioned at the end of section 4, the model of Knoester and Buitelaar (see, e.g. Buitelaar, 1988, tables 5.2 and 5.3) most clearly generates a turn from unfavourable to favourable effects on total income and employment in case of a policy of fiscal restraint. The Knoester and Buitelaar model is a fully fledged third generation policy model for the Netherlands, although it is not used in actual policy analysis. It is, however, not the interest rate mechanism but the combination of the direct money transmission in the expenditure equations (eq. 1a and 1b) and the supply determined modelling of this monetary transmission variable (in our case the broadly defined money stock, M2; eq. 11a and 11b) that causes this turn. Mod CSM determines M2 by a money demand equation, representing accommodating monetary policy. Under that assumption the expenditure policy leads to a fall in M2 as total expenditure decreases. In other words: there is no monetary ease which by way of direct money transmission partly offsets the fall in demand. In their model Knoester and Buitelaar describe the working of quite another mechanism. In terms of the structure of the models used here this mechanism is the following: the variable representing direct money transmission is determined by the sources of money supply (eq. 11a and 11b).

The left hand side of table 5 shows the effects of an expenditure policy according to such modelling of monetary policy. Under the assumption of full capital market financing of the government deficit the relevant sources of money supply are the national liquidity surplus and net money-creating operations by banks. The latter source is assumed to be exogenous representing non accommodating monetary policy. As the expenditure policy leads to

a surplus on the current account of the balance of payments, the national liquidity surplus increases in spite of the fact that part of the surplus on the current account disappears abroad due to private sector foreign capital transactions. Hence, according to this version of Mod CSM, as shown in table 5, M2 rises in reaction to the expenditure policy. In that case direct money transmission indeed causes the effects of the expenditure policy on consumption and investment to turn from negative to positive in the long run. However, the influence of direct money transmission, with a long term elasticity of 0.15, appears not to be large enough to make this mechanism lead to a turn in total expenditure through which employment rises as a result of the policy of reducing government expenditure.

This is illustrated by the right hand side of table 5, which shows the simulation results of the policy of fiscal restraint according to a version of Mod CSM in which the money supply is determined by sources and in which the coefficients of direct money transmission in the consumption and investment functions are doubled. Hence this version of the model assumes a long term elasticity of direct money transmission of 0.3. Now, after six years in the simulation period, the effects of the fiscal policy of restraint on total income and employment appear to be slightly positive.

Table 5. The effects of an autonomous reduction of government expenditure of 1% of national income.
(in % of the baseline projection, unless stated otherwise)

	according to Mod CSM (money supply by sources)					Mod CSM (idem, doubling of coefficients of direct money transm.)			
	after	1qu	1yr	3yr	6yr	1qu	1yr	3yr	6yr
Volume of income		-0.7	-0.4	-0.2	-0.1	-0.7	-0.3	-0.1	0.1
Volume of private consumption		-0.5	-0.2	0.2	0.5	-0.5	0.0	0.6	1.0
Volume of investments		-0.8	0.1	0.1	0.6	-0.7	0.3	0.5	1.1
Price level		-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0
Wage level		-0.1	-0.4	-0.3	-0.2	-0.1	-0.4	-0.2	-0.0
Demand for labour		-0.1	-0.2	-0.1	-0.1	-0.1	-0.2	-0.0	0.0
Money stock (deflated)		0.3	1.0	2.2	3.5	0.3	1.0	2.0	3.0
Unemployment (in lab. years x1000)		3	6	2	2	3	5	0	-1
Surplus current account (in % NI)		0.7	0.8	0.6	0.4	0.7	0.7	0.4	0.1
Fin. deficit government (in % NI)		-0.9	-1.0	-1.2	-1.4	-0.9	-1.0	-1.2	-1.4
Interest rate (%-points)		-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2

Hence, the question of whether such turn occurs remains an empirical one in this model, and largely depends on the size of the influence of direct money transmission on expenditure. It is, however, doubtful whether this way of modelling the monetary sector describes the actual situation in the Netherlands. It implies that the plea of the monetary authorities to reduce the government deficit would be directed at stimulating the inflow of money from abroad in order to enhance expenditure. It is most improbable that the Dutch monetary authorities in their support for the reduction of government expenditure, envisage such mechanism, the more so as the large current account surplus at

present already results in a considerable inflow of money from abroad.

7. Monetary policy.

Monetary policy in the Netherlands has traditionally been directed at controlling money growth. Although the link between monetary policy and employment has been the subject of some discussion (see Kessler, 1980) and although, at least in the sixties and the mid seventies, employment as a policy goal has played a major role in the timing of monetary policy (see Fase en Den Butter, 1977), monetary instruments have never been considered to be very effective in labour market policy. In order to investigate this we have run a number of simulations with versions of the models in which the money stock is supply determined. Like in the previous section the money supply is modelled to stem from the usual three sources distinguished in Dutch monetary analysis: domestic credit, inflow of money from abroad and government liquidity creation (eq. 11a). All simulations assume capital market financing of the government deficit so that there is no liquidity creation by the government. Inflow of money from abroad is endogenous and cannot be controlled by the central bank. Therefore, in conformity with the way monetary policy is actually conducted in the Netherlands, we have simulated a policy of monetary ease by an autonomous increase of net money creating operations. The simulations relate to an increase by 5% of national income in the first four quarters of the simulation period, which leads to a permanent autonomous rise of the nominal money supply of about 8%.

Table 6. The effects of an autonomous increase of net money-creating operations by 5% Y over the period of one year.
(in % of the baseline projection, unless stated otherwise)

on	according to, Mod CSM (money supply by sources)					Mod CSM (idem, doubling coeff. of direct money transm.)				Mod CSM (idem, doubling dir.mon.tr. and 10x price-effect)			
	after	1qu	1yr	3yr	6yr	1qu	1yr	3yr	6yr	1qu	1yr	3yr	6yr
Volume of income		0.1	0.5	0.3	0.4	0.2	1.0	0.5	0.6	0.2	0.8	0.4	0.5
Volume of private consumption		0.3	1.8	1.1	0.9	0.7	3.1	1.8	1.2	0.6	2.9	1.7	1.4
Volume of investments		0.4	2.5	1.4	1.0	0.8	3.8	2.2	1.3	0.8	4.8	1.5	1.3
Price level		0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.8	0.6	0.2
Wage level		0.0	0.3	0.3	0.3	0.0	0.5	0.5	0.4	0.1	0.7	0.6	0.5
Demand for labour		0.0	0.2	0.1	0.2	0.0	0.4	0.2	0.4	0.0	0.4	0.3	0.4
Money stock (deflated)		2.1	7.5	5.6	4.3	2.0	7.1	4.5	2.7	2.0	6.8	4.8	3.2
Unemployment (in lab. years x1000)		-1	-6	-3	-6	-1	-11	-7	-12	-1	-12	-7	-10
Surplus current account (in % NI)		-0.1	-0.8	-0.6	-0.3	-0.3	-1.4	-0.9	-0.4	-0.2	-1.1	-0.6	-0.4
Fin. deficit government (in % NI)		-0.1	-0.3	-0.2	-0.2	-0.1	-0.4	-0.3	-0.2	-0.1	-0.4	-0.3	-0.3
Interest rate (%-points)		-0.5	-0.6	-0.0	0.0	-0.5	-0.6	0.0	0.0	-0.5	-0.5	-0.0	-0.0

The simulation results in the first part of table 6 for Mod CSM show that this impulse causes the money stock to rise by 7.5 % in the first year of the simulation period. Thereafter the effect of the impulse on the money stock becomes smaller because the monetary impulse leads to a deficit on the current account and hence to outflow of money abroad. The simulation results for Mod

CSM indicate that the effects of this stimulative monetary policy on total expenditure and especially on employment are rather modest. This impulse does not result in a permanent reduction of the interest rate so that in this model direct money transmission is the main transmission channel of monetary policy.

In order to illustrate this, the second part of table 6 gives simulation results according to a version of Mod CSM in which the coefficient values of direct money transmission in the consumption and investment functions are doubled and are set to a value which corresponds to a long term elasticity of 0.3. The simulation results show that this specification change leads to effects on total expenditure and employment which are twice as high as well. Because of the larger current account deficit the final endogenous effect on the money stock is smaller than in the standard version of the model.

The results of the first two simulations of table 6 show that the monetary impulse, according to these models, hardly affects the price level. Thus these models contain no mechanism which makes money neutral in the long run. The influence of monetary policy on prices is modelled here through the utilization rate of the capital stock as determinant in the price equation (eq. 3a). Apparently the assumed influence, with a long run elasticity of 0.2, is rather low. Therefore the third part of table 6 gives the simulation results according to a variant of Mod CSM in which the coefficient value of this variable is multiplied by 10 and in which direct money transmission has again been set to a long term elasticity value of 0.3. Now we see that part of the monetary impulse leaks away to inflation and that therefore the stimulative effect on total expenditure and on employment is somewhat mitigated. Yet the price effect is rather limited. It illustrates that policy models in which prices are explicitly modelled with cost factors as main determinants do not tend to describe money as neutral.

8. Exchange rate policy.

In the last decades exchange rate policy in the Netherlands has aimed at stable exchange rates. This is effectuated by linking the guilder to the German mark. In fact this option for a strong guilder has resulted in some appreciation of the guilder vis à vis the indexed values of the currencies of the main competitors of the Netherlands. There has been some debate whether this exchange rate policy would be beneficial to employment. The call for a more permissive exchange rate policy was especially strong at the end of the seventies when the trade balance was in deficit and the appreciation of the guilder had led to a substantial deterioration of the competitive position (for a survey of the debate: see Szász, 1981). Nowadays, the balance of payments surplus and the strong competitive position leaves less argument for a devaluation.

In order to investigate the effects of the exchange rate policy, we have simulated a once and for all increase of the exogenous exchange rate index by 10%. The results of this appreciation

according to Mod CSM are in the first part of table 7. We see that according to this model, the appreciation leads to less income because of the worsening of the competitive position. The fall in the volume of exports is matched by an almost equal fall in the volume of imports, which is due to the fall in demand and the decline of the utilization rate of capital goods. The appreciation and the better terms of trade result in a considerable surplus on the current account in the first quarters of the simulation period. Because of a decline in labour costs and lagged effects in the price-wage spiral, employment rises in the second part of simulation period, so that in that period the positive influence of the lower labour costs on the labour market outweighs the negative influence of the fall in demand.

The money stock in Mod CSM is demand determined with income as scaling variable. Therefore neither the price deflation nor the inflow of money from abroad, which results from the trade balance surplus, lead to a higher real money stock. For that reason Mod CSM describes no wealth effects which would compensate the income effects in the expenditure equations. In order to include these influences into the model we have simulated the appreciation by means of a version of Mod CSM in which the money stock is determined by the sources of money supply. The results are in the second part of table 7. They show that now the price deflation and the inflow of money from abroad lead to a considerable rise of the real money stock, especially in the second part of the simulation period. The appreciation is illustrated to lead to a rise, instead of a decline, of total income at the end of the simulation period. Hence, in that period the surplus on the trade balance turns into a deficit.

Table 7. The effects of a policy induced appreciation of the exchange rate by 10%.
(in % of the baseline projection, unless stated otherwise)

on	according to Mod CSM					Mod CSM (money supply by sources)				Mod CSM (permanent apprecia- tion expectations)				Mod CSM (money supply by sour- ces, perm. appr. expectations)						
	after	1qu	1yr	3yr	6yr	1qu	1yr	3yr	6yr	1qu	1yr	3yr	6yr	1qu	1yr	3yr	6yr			
Volume of income						-2.7	-3.3	-1.0	-0.8	-2.5	-2.6	-0.1	0.5	-2.7	-3.2	-0.9	-0.8			
Volume of private consumption						-2.9	-4.0	-1.4	-1.0	-2.4	-1.9	1.6	2.7	-2.9	-3.8	-1.3	-0.9			
Volume of investments						-4.1	-6.3	-5.7	-2.4	-3.5	-3.6	-2.0	1.9	-4.1	-5.9	-5.4	-2.3			
Price level						-1.2	-4.1	-8.0	-9.4	-1.2	-4.1	-7.9	-9.2	-1.2	-4.1	-8.0	-9.4			
Wage level						-2.7	-7.9	-10.3	-10.5	-2.6	-7.5	-9.6	-9.6	-2.7	-7.8	-10.2	-10.5			
Demand for labour						-0.3	-0.8	1.0	0.4	-0.3	-0.5	1.3	1.0	-0.3	-0.8	1.0	0.3			
Money stock (deflated)						-0.6	0.2	0.5	-1.0	2.9	9.2	15.6	17.5	-0.4	0.5	0.9	-0.8			
Unemployment (in lab. years x1000)		11	24	-27	-9		10	16	-36	-26		11	23	-27	-8		10	13	-40	-42
Surplus current account (in % NI)		3.9	2.9	2.0	0.6		3.8	2.0	0.6	-1.1		3.9	2.8	1.9	0.5		3.7	1.6	-0.8	-3.6
Fin. deficit government (in % NI)		0.9	1.5	1.3	1.8		0.8	1.1	0.7	1.1		0.9	1.4	1.2	1.8		0.8	0.9	0.0	-0.2
Interest rate (1-points)		0.7	-0.1	-0.0	0.3		-0.2	-0.7	-0.5	0.1		0.3	-0.5	-0.2	0.3		-0.8	-1.3	-1.3	-0.8

One of the main arguments for stable exchange rates and a strong guilder is that it reduces uncertainty and enhances credibility of monetary policy. These elements are not built into the models and probably are of a asymmetrical character. We tried to account for these reputation effects by assuming that the policy of appreciation will lead to a permanent rise of exchange rates

expectations by 10%. In technical terms: exchange rates expectations are made exogenous in the models (scrapping of eq. 9a and 9b) and are given a permanent impulse of 10%. The third part of table 7 shows the simulation results according to Mod CSM, in which the money stock is demand determined and the fourth part of table 7 shows the result for the version of Mod CSM in which the sources of money supply determine the money stock. In case of a demand determined money stock these reputation influences do not lead to big differences in outcome. This is shown by the comparison of the first part of table 7 with the third part. However, in the case of a money supply determined money stock, the influence is substantial. The appreciation expectations result in a lower interest rate and in an increased inflow of capital from abroad. In combination with the balance of trade surplus this inflow of capital causes a very substantial rise of the real money stock. Thus, according to this model, the appreciation finally leads to a strong rise of total income and of employment in the last years of the simulation period. It must be noted that these simulations assume that the inflow of money and hence the rise of the liquidity ratio is not curbed by a restrictive monetary policy.

9. Conclusions.

This paper focusses on

- the quantitative impact on economic activity and on the labour market of various forms of fiscal and monetary policy;
- the extent to which this impact as measured by simulations with macroeconomic policy models is dependent upon model specification and upon crucial parameter values.

The simulation experiments of the paper show that

- according to our stylized versions of the main-stream macroeconomic policy models fiscal and monetary policy is not very effective in enhancing total income and employment; as compared to other policy measures exchange rate policy is shown to yield relatively large effects;
- the size and even the sign of the effects appears to depend strongly on the way the economy has been modelled; crucial parameter values are important in this respect, but more so the differences in model specification which mirror differences in interpretation and in theoretical thinking on how the economy works.

The main remaining question is whether these conclusions imply that, in the Netherlands, there is no scope at all for fiscal and monetary labour market policy. The answer to this question is no, because it should be realized that the way in which fiscal and monetary policy can, at this moment, influence the labour market, is difficult to assess by empirical policy models and by theory based on observed economic behaviour. This has not much to do with the well known Lucas critique on the use of policy models, but with the fact that fiscal policy and, in particular, monetary policy has a strong conditioning character. Thus, in periods in which this policy has established its reputation by cautiously maintaining price stability and financial equilibrium between the various sectors of the economy, the fiscal and monetary autho-

rities cannot do better for the labour market than to keep up with this policy. On the other hand, in case the authorities fail to maintain these balancing conditions, e.g. by allowing large financial deficits of the public sector or by a too permissive (or too tight) monetary policy, the resulting instability and loss of reputation may have serious repercussions for the labour market. In other words, a sound fiscal and monetary policy always is a necessary condition for a good functioning of the labour market, but can never be a sufficient condition and do the job all by itself.

That is why traditional Dutch monetary analysis has focused much more on monetary conditions and on realizing internal and external equilibrium than on the scope for stimulating the economy by monetary impulses (see Holtrop, 1972). For that reason Kessler (1986) advocates to test the outcomes of causal policy models, as used in this paper, against the normative analysis of the monetary condition model. A synthesis between both lines of thought could be achieved by paying more attention to normative elements in the design of causal policy models, e.g. by regime switches in the case of a serious loss of reputation or by asymmetric and ratchet effects. Another promising road in this respect is modelling of model (in)consistent expectations. Yet these elements are most difficult to build into the Dutch policy models as fiscal and monetary policy in this country has always been rather cautious. Therefore no observations are available on what happens in case monetary or fiscal conditions surpass their critical values.

References.

Acx, R. and W. de Vijlder, 1985, Technische analyse van de causaliteit tussen binnenlandse overheidsleningen en rente in België, Cahiers Économiques de Bruxelles, No. 108, blz. 431-457.

Bovenberg, A.L., 1987, Long-term and short-term interest rates in the United States: an empirical analysis, IMF Working Paper, WP/87/84.

Buitelaar, P., 1987, Overheidsfinanciën en Economische Politiek (Van Gorcum, Assen/Maastricht).

Butter, F.A.G. den, 1977, De economische levensduur van kapitaal-goederen in een clay-clay jaargangenmodel, Maandschrift Economie, 41, pp. 205-231.

Butter, F.A.G. den, 1987, Model en Theorie in de Macro-economie (Stenfert Kroese, Leiden).

Butter, F.A.G. den, 1988, The DNB econometric model of the Netherlands economy (MORKMON), in W. Driehuis, M.M.G. Fase and H. den Hartog (eds.), Challenges for Macroeconomic Modelling (North-Holland, Amsterdam), blz. 405-431.

Butter, F.A.G. den, 1989, Macroeconomic Modelling and the Policy of Restraint in the Netherlands (Free University, Amsterdam), mimeo.

Butter, F.A.G. den, and B. Compaijen, 1989, Labour Market Effects of the Social Security System in the Netherlands (Free University, Amsterdam), mimeo.

Centraal Planbureau, 1983, FREIA. Een Macro-economisch Model voor de Middellange Termijn, Monografie 25 (Centraal Planbureau, 's-Gravenhage).

Duguay, P. and Y. Rabreau, 1987, Les Effets Macro-économiques des Déficits Budgétaires: Résultats d'un Modèle de Simulation, Rapport Technique Banque du Canada No. 47 (Banque du Canada, Ottawa).

Evans, P., 1987a, Interest rates and expected future budget deficits in the United States, Journal of Political Economy, 95, blz. 34-58.

Evans, P., 1987b, Do budget deficits raise nominal interest rates? Evidence from six countries, Journal of Monetary Economics, 20, blz. 281-300.

Fase, M.M.G. and F.A.G. den Butter, 1977, The endogeneity of monetary policy in the Netherlands, Cahiers Économiques et Monétaires, 6, Banque de France, pp. 177-204.

Feldstein, M., 1986, Budget deficits, tax rules, and real interest rates, NBER Working Paper, No. 1970.

Frenkel, J.A. and A. Razin, 1987, The Mundell-Flemming model a quarter century later. A unified exposition, IMF Staff Papers, 34, pp. 567-620.

Haan, J. de, and D. Zelhorst, 1989, Particuliere besparingen en overheidsschuld: de analyses van Boskin e.a., een Nederlandse invalshoek, Maandschrift Economie, 53, blz. 4-17.

Hoelscher, G., 1986, New evidence on deficits and interest rates, Journal of Money, Credit and Banking, 18, blz. 1-17.

Holtrop, M.W., 1972, Money in an Open Economy (Stenfert Kroese, Leiden).

Kessler, G.A., 1980, De invloed van het Nederlandse monetair beleid en wisselkoersbeleid op de ontwikkeling van de werkgelegenheid, Maandschrift Economie, 45, blz. 53-80.

Kessler, G.A., 1986, Van monetair conditiemodel tot causaal monetair model, in W. Driehuis and R.A. de Klerk (eds.), Economie als Spel (Stenfert Kroese, Leiden), pp. 123-147.

Kuipers, S.K., B.W.A. Jongbloed, G.A. Kuper and E. Sterken, 1988, CESAM. Het CCSO Jaarmodel van de Nederlandse Economie (Wolters-Noordhoff, Groningen)

Leiderman, L. and M.I. Bleijer, 1988, Modelling and testing Ricardian Equivalence; A survey, IMF Staff Papers, 35, blz. 1-35.

Loo, P.D. van, 1984, De hoogte van de kapitaalmarkrente, Maandschrift Economie, 48, blz. 123-139.

Malcomson, J.M., 1975, Replacement and the rental value of capital equipment subject to obsolescence, Journal of Economic Theory, 10, pp. 24-41.

Muiswinkel, L.F. van, 1985, Hoge rentelasten en financieringsbehoeften: angst is een slechte raadgever, Economisch Statistische Berichten, 70, blz. 268-270, 278.

Naudts, B. and E. Schokkaert, 1988, Government debt and interest rates in Belgium 1974-1986, Tijdschrift voor Economie en Management, 33, blz. 339-354.

De Nederlandsche Bank N.V., 1985, MORKMON. A Quarterly Model of the Netherlands Economy for Macro-economic Policy Analysis, Monetary Monographs No. 2 (De Nederlandsche Bank N.V./ Martinus Nijhoff, Dordrecht).

Okker, V.R., 1988, The CPB econometric model of the Netherlands economy (FREIA-KOMPAS), in W. Driehuis, M.M.G. Fase and H. den Hartog (eds.), Challenges for Macroeconomic Modelling (North-Holland, Amsterdam), blz. 457-481.

Parkin, M. and R. Bade, 1982, Modern Macroeconomics (Philip Allen, Oxford).

Sinderen, J. van, 1982, Revaluatie, financieringstekort en rentestand, een empirische benadering, Economisch Statistische Berichten, 76, blz. 144-148.

Spiro, P.S., 1987, The elusive effect of fiscal deficits on interest rates. Comment on Tanzi, IMF Staff-papers, 34, blz. 400-403.

Szász, A., 1981, Het wisselkoersdebat, in E. den Dunnen, M.M.G. Fase and A. Szász (eds.), Zoeklicht op Beleid (Stenfert Kroese, Leiden), blz. 303-323.

Tanzi, V., 1985, Fiscal deficits and interest rates in the United States. An empirical analysis, 1960-84, IMF Staff-papers, 32, blz. 551-576.

Tanzi, V., 1987, The effect of fiscal deficits on interest rates. Reply to Spiro, IMF Staff-papers, 34, blz. 404-407.

Wellink, A.H.E.M., 1987a, Enkele beschouwingen over de noodzaak tot verdere ombuigingen van collectieve uitgaven, in Veranderingsoperaties in de Publieke Sector: Doorgaan maar hoe? (Instituut voor Onderzoek van Overheidsuitgaven, s'-Gravenhage), blz. 19-48.

Wellink, A.H.E.M., 1987b, De ontwikkelingen in de jaren zeventig en tachtig en enkele daaruit te trekken lessen, in A. Knoester

(ed.), Lessen uit het Verleden (Stenfert Kroese, Leiden), blz. 333-365.

Zahid, K.H. ,1988, Government budget deficits and interest rates: the evidence since 1971, using alternative measures, Southern Economic Journal, 54, blz. 725-731.

ANNEX

A. Equations.

(1) Expenditure

$$a. \ln c = \text{const} + 0.2 \ln c_{-1} + 0.64 \ln (y_b - \tau FT_0/p) - 0.3 \ln \{(r+100)/(\dot{p}^e+100)\}_{-1} + 0.12 \ln m_2$$

$$b. \ln i = \text{const} + 0.2 \ln i_{-1} + 0.8 \ln y - 1.2 \ln \{(r+100)/(\dot{p}^e+100)\}_{-1} + 0.12 \ln m_2 - 1.6 \ln (\dot{w}-\dot{p}-\dot{a}_g+100) + 0.4 \ln q_k$$

$$c. i_{gen} = \frac{1}{4} \sum_{j=0}^3 i_{-j}$$

$$d. i_{wo} = (i_{gen} / i_{gen-1}) i_{wo-1}$$

$$e. \ln b = \text{const} + 0.6 \ln b_{-1} + 1.0 (\ln m_w - 0.6 \ln m_{w-1}) + 0.8 \ln p_m/p_v$$

$$f. \ln m = \text{const} + 0.6 \ln m_{-1} + 1.0 (\ln y - 0.6 \ln y_{-1}) - 0.3 \ln p_m/p_v + 1.0 \ln q_k$$

$$g. n = 0.005 y$$

$$h. y = c + i + i_{wo} + g + b - m + n + y_{aut}$$

$$i. y_b = (y - ty) \frac{(w/p) (a+a_{ov})}{(w/p)_{-1} (a+a_{ov})_{-1}}$$

$$j. q_k = y/y^n$$

(2) Money demand

$$a. \ln m_2 = \text{const} - 0.8 \ln m_{2-1} + 0.2 \ln y - 0.48 \ln (r+100) - 0.2 \ln (\dot{p}+100) - 0.2 \ln q_L + 0.48 \ln (r_k+100)$$

(3) Wage and price formation

$$a. \ln p = \text{const} + 0.8 \ln p_{-1} + 0.12 \ln w + 0.05 \ln q_k - 0.16 \ln a_g + 0.1 \ln t \\ + 0.08 \ln p_m$$

$$b. \ln w = \text{const} + 0.5 \ln w_{-1} + 0.5 \ln p_v + 0.25 \ln q_L + 0.5 \ln a_g \\ + 0.125 \ln t$$

$$c. \dot{p} = \Delta^4 \ln p \times 100$$

$$d. \dot{w} = \Delta^4 \ln w \times 100$$

$$e. \ln p_v = \{1/(1+m_q)\} \ln p + \{m_q/(1+m_q)\} \ln p_m$$

(4) Inflationary expectations

$$a. \dot{p}_e = \dot{p}_{-1}$$

$$b. \dot{w}^e = \dot{w}_{-1}$$

(5) Labour demand

(by quasi vintage approach)

$$a. a = \text{const} + a^* - 0.5 \left(1 - \frac{1}{4} \sum_{j=0}^3 [y/y^{nt}]_{-j} \right) a^*$$

$$b. a^* = 0.018 \{ 1 + 0.5 (1-h) \} k e^{-\Sigma \mu / 100} . e^{-0.01 \Sigma (c_{af}-1)}$$

$$c. y^{nt} = y^{nb} \cdot y/y_{bn}$$

$$d. y^{nb} = (1/\kappa) k e^{\Sigma \mu' / 100}$$

$$e. k = k_{-1} + i - k_a$$

$$f. k_a = 0.015 (1 + 0.25 [\mu - 1.25]) c_{af} k_{-1}$$

$$g. (\dot{w}-\dot{p})_{gem} = \frac{1}{4} \sum_{j=0}^3 (\dot{w}-\dot{p})_{-j}$$

$$h. (r-\dot{p}^e)_{gem} = k \sum_{j=0}^3 (r-\dot{p}^e)_{-j}$$

$$i. c_{af} = \{ 1 + 0.4 \left[\frac{(\dot{w}-\dot{p})_{gem} - 4\mu}{4\mu} \right] \} \{ 1 - 0.015 [(r-\dot{p}^e)_{gem} - (r-\dot{p}^e)_0] \}$$

(6) Labour supply

$$a. \ln a_s = \text{const} + 0.5 \ln a_{s-1} + 0.5 \ln a_p + 0.15 \ln q_L$$

$$b. U = a_s - a - a_{ov}$$

$$c. q_L = 1 - U/a_s$$

$$d. a_g = a_{g-1} \left\{ 1 + k \left[\frac{y/(a + a_{ov}) - y_{-4}/(a + a_{ov})_{-4}}{y_{-4}/(a + a_{ov})_{-4}} \right] \right\}$$

$$e. \dot{a}_g = \Delta^4 \ln a_g \times 100$$

$$f. y^n = 0.975 y^{n-1}$$

(7) Current account of balance of payments

$$a. p_m = e p_{bu}$$

$$b. M = p_m \cdot m$$

$$c. B = p b$$

$$d. LR_c = B - M - D_s$$

(8) Government budget restriction

$$a. FT_0 = p (g - ty) + Re + G_{ex}$$

(9) Sources of financial assets

$$a. \dot{e} = 100 \cdot (e - e_{-1}) / e_{-1}$$

$$b. \dot{e}^e = \dot{e}_{-1}$$

$$c. KV = \text{const} + 0.5 KV_{-1} + 0.005 \Delta(r - r_{bu}) (B + M)_{-1} - 0.0016 \dot{e}^e (B + M)_{-1} - 0.25 LR_t$$

$$d. NLO = LR_t + KV + RVLR$$

$$e. rg = 1/20 \sum_{j=0}^{19} r_{-j}$$

$$f. Re = 0.95 Re_{-1} + r/100 \{ 0.3 FT_{o-1} + 0.05 Re_{-1} 100/rg \}$$

$$g. LC_o = \eta FT_o$$

$$h. FO_{ps} = FT_o + NLO - KV = FT_o + LR_t + RVLR$$

$$i. Y = py$$

$$j. BKV_{ps} = \text{const} + 0.8 BKV_{ps-1} + 0.5 \Delta Y - 0.1 FO_{ps} - 0.03 \Delta r Y$$

$$k. FA = FA_{-1} + BKV_{ps} + FT_o + NLO$$

$$l. M2 = p.m2$$

$$m. NGB = \Delta M2 - NLO - LC_o - OPSV$$

$$n. fa = FA/p$$

(10) Interest rate

$$a. r = \text{const} + 0.15 \dot{p}^e + 0.15 r_k + 0.75 r_{bu} + 0.1 \dot{e}^e + 0.25 (BKV_{ps} - NGB).100/Y + 0.25 (FT_o - LC_o).100/Y$$

(11) Sources of money supply

$$a. M2 = M2_{-1} + NGB + NLO + LC_o + OPSV$$

$$b. m2 = M2/p$$

plus (9) $a - k$ and n (NGB exogenous)

B. Models.

Mod CS : (1) + (2) + (3) + (4) + (5) + (6) + (7) + (8)

Mod CSM : (1) + (2) + (3) + (4) + (5) + (6) + (7) + (8) + (9) + (10)

Mod CSMs (money supply determined by sources) :

(1) + (3) + (4) + (5) + (6) + (7) + (8) + (10) + (11)

C. List of symbols.

a	labour demand by enterprises	
a_a	labour supply	
a_g	labour productivity	
\dot{a}_g	labour productivity growth	
a_{ov}	labour demand by government	#
a_p	working age population	#
a^*	full capacity labour demand by enterprises	
B	value of exports	
b	volume of exports	
BKV_{ps}	gross domestic demand for credit by private sector	
c	volume of private consumption	
e	exchange rate index (1977=1); guilders in foreign currency	#
\dot{e}	exchange rate change	
\dot{e}^e	expected exchange rate change	
FA	value of private sector's domestic financial assets	
fa	volume of private sector's domestic financial assets	
FO_{ps}	financial surplus of private sector	
FT_o	financial deficit of government (on a cash basis)	
G	value of government expenditure	#
g	volume of government expenditure	
G_{ex}	residual net government expenditure	#
h	index number of hours worked in enterprises (1970=1)	#
i	volume of gross fixed investments (enterprises)	
i_{wo}	volume of gross investments in dwellings	
k	volume of capital stock	
k_a	scrapping of capital stock	
KV	net private sector foreign capital transactions	
LC_o	government liquidity creation	
LR_t	current account of the balance of payments (on a transactions basis)	
M	value of imports	
m	volume of imports	
m_w	world trade index (1977=100)	#
$M2$	value of broadly defined money stock	
$m2$	volume of broadly defined money stock	
m_q	ratio of imports to income	#

n	volume of stockbuilding	
NGB	net money-creating operations	
NLO	national liquidity surplus	
OPSV	net miscellaneous items (residual source of money supply)	#
p	price index of gross national product (1977=1)	
\dot{p}	rate of inflation	
\dot{p}^e	inflationary expectations	
P_{bu}	index of foreign prices (1977=1)	#
P_m	index of import prices (1977=1)	
P_v	expenditure price index	
q_k	utilization rate of capital stock	
q_L	utilization rate of labour	
r	(long term) interest rate	
r_{bu}	long term foreign interest rate	#
Re	interest payments of government	
r_k	short term interest rate	#
RVLR	difference between current account on a cash and on a transactions basis	#
t	burden of taxation	
U	unemployment	
w	wage level	
\dot{w}	wage inflation	
\dot{w}^e	expected wage inflation	
Y	value of (gross) national product	
y	volume of (gross) national product	
y_b	disposable income	
y_{aut}	autonomous part of volume of (gross) national product	#
y/y_{bn}	ratio of national product and production by enterprises	#
y^n	structural or natural level of income	
y^{nb}	productive capacity of enterprises	
y^{nt}	total productive capacity	
η	share of short term financing of government deficit	#
κ	capital output ratio	#
μ	labour saving technical progress	#
μ'	capital saving technical progress	#
τ	tax anticipation rate of government deficit	#

Explanatory note: # indicates variables which are exogenous in all models.